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Asymmetries and Macroeconomic Shocks: The Pre-Crisis Period and Evidence for Europe[1]

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Asimetriler ve Makroekonomik Şoklar: Kriz Öncesi Dönem ve Avrupa İçin Kanıtlar[2]

Abstract

The main purpose of this paper is to discover the underlying structure of the debt crisis and examine the cross-country differences by analyzing the asymmetric supply and demand shocks for the member and candidate countries of the European Union for the pre-crisis period. Following the path of Bayoumi and Eichengreen (1993, 1997) and Blanchard and Quah (1989), the calculations show us that Greece has the largest supply shocks, while Turkey has the largest demand shocks. By looking at the impulse response functions associated with the SVARs, it is clear that Greece has the lowest adjustment speed to demand disturbances followed by the United Kingdom. Those countries which experienced debt crises in the EMU, seemed to have big supply and demand shocks and compared to other member countries the adjustment speed of their economies to these shocks are slower.

Keywords : Supply and Demand Shocks, Symmetric vs. Asymmetric Shocks, Adjustment Speeds, the EMU, Optimum Currency Area, Structural VAR (SVAR).

JEL Classification Codes : O52, F15, F42, G01, C32, C51.

Öz

Bu yazının asıl amacı, borç krizinin temelini açıklamak ve kriz öncesi dönemde Avrupa Birliği'ne üye ve aday ülkeler için asimetrik arz ve talep şoklarını analiz ederek ülkeler arasındaki farklılıkları incelemektir. Bayoumi ve Eichengreen (1993, 1997) ve Blanchard ve Quah (1989) 'un yolunu takiben yapılan hesaplamalar Yunanistan'ın en büyük arz şoklarına sahip olduğunu, Türkiye'nin ise en büyük talep şoklarına sahip olduğunu göstermektedir. Yapısal VAR analizi sonuçları incelendiğinde, Yunanistan'ın talep şoklarındaki düzensizliklere karşı Birleşik Krallık ile birlikte en düşük uyarlanma hızına sahip ülkeler olduğu görülmektedir. Diğer ülkeler ile

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[2] *Bu makale çalışması Dokuz Eylül Üniversitesi Sosyal Bilimler Enstitüsü bünyesinde İktisat Anabilim Dalında Doktora Tezi olarak kabul edilen "Optimum Para Sahası, Parasal Birlik ve İktisadi Şoklar: Avrupa Parasal Birliği ve Türkiye Eksenli bir İktisadi Analiz" adlı doktora tezinden türetilmiştir.*

kıyaslandığında borç krizi yaşayan ülkelerin karşılaştıkları arz ve talep şoklarının hem büyük olduğu hem de bu ülkelerin bu şoklara uyum hızlarının düşük olduğu görülmektedir.

Anahtar Sözcükler : Arz ve Talep Şokları, Simetrik vs. Asimetrik Şoklar, Ayarlama Hızları, EMU, Optimum Para Birimi Alanı, Yapısal VAR (SVAR).

1. Introduction

The subject of optimal currency area has become an important topic in the literature of economics after Mundell's (1961), McKinnon's (1963) and Kenen's (1969) powerful works, in which they demonstrated the criteria to identify a currency union as an optimal. Initial studies on the optimal currency area sphere have set out the criteria for the participation of countries in a monetary union (Dellas & Tavlas, 2009; Kim & Chow, 2003; Alakbarov, 2013). However, the endogeneity hypothesis of the optimum currency area criteria, initiated by Frankel and Rose (1997, 1998) has focused on the change of the economic structure and performance of countries that will emerge after participating in a monetary union.

Shocks are variety of disturbances that disrupt the normal functioning of the production and exchange process. Each economy is subject to a wide range of shocks. Our main concern is to analyze the distinction relating the areas affected by a particular shock. This distinction relates to the symmetry or asymmetry of the effects of the shock. Symmetry refers to the equality of distribution of the effects of the shock across regions, industries or factor markets. Symmetric shocks affect regions, industries and/or factor markets similarly. Asymmetric shocks affect regions, industries and/or factor markets differentially (Martin-Das, 2002: 63-64). An external shock is defined as unexpected change of an external varible. In case of shocks, changes happen in the economic set up and as a result adjustment is experienced afterwords. Sudden changes of external factors that causes supply shock could be listed as: raw material prices, wage and salary costs; labor productivity, technological innovations; tax laws and natural disasters. Sudden changes of external factors that cause demand shocks are as follows: the price level; income tax, government debt, exchange rates, consumer confidence ("Investopedia Financial Dictionary", n.d.).

The main purpose of this paper is to discover the underlying dynamics of the debt crisis and examine the cross-country differences by analyzing the asymmetric supply and demand shocks for the member and candidate countries of the European Union for the period 1980-2004 by following the path of Bayoumi and Eichengreen (1993, 1994, 1997) and Blanchard and Quah (1989). By examining the supply and demand shocks of the countries concerned, we especially focus on whether those countries satisfy the necessary conditions when creating monetary union. This article decomposes shocks asymmetry into two dimensions: i) the correlation of the shocks, ii) the size of the shocks and the speed of adjustment to these shocks of the relevant country's economy when faced with the shocks, i.e. high or low adjustment abilities. Following the study Bayoumi and Eichengreen (1993, 1997) and Blanchard and Quah (1989)'s, impulse-response functions are investigated by using regression analysis that employs structural VAR (SVAR) method and adjustment

speeds of the countries anylyzed against the supply and demand shocks are also revealed. The analysis primarily reveals if the countries are exposed to similar supply and demand shocks, and how they adopt to these shocks.

Many studies have provided sufficient evidence on the presence of contagion in the Eurozone and in the international arena during periods of financial crisis. The EU's sovereign debt crisis has raised serious concerns about the Eurozone's imbalances and its fragility to major global financial shocks (Papavassiliou, 2014). In this research, we focus upon some important aspects of macroeconomic shocks in currency unions and demonstrate that whether supply and demand shocks in analyzed countries that faced with significant sovereign debt crisis are correlated with essential countries of the EMU. That is, we apply the optimum currency area by associating it with the sovereign debt crisis. In order to identify structural shocks and derive impulse response functions and variance decompositions, we input into the equation long run restrictions in the spirit of Blanchard and Quah (1989). Consequently, size, adjustment speed and correlations of demand and supply shocks are calculated for different countries.

The plan of this article is as follows. Following section is divided into theoretical background and literature review. The effects of shocks on the diagram in this section are set forth briefly. The third section includes the empirical analysis of shocks in some countries of the EU. This section briefly describes the SVAR method and data analysis is performed afterwords. Correlation of supply and demand shocks, magnitude of the shocks, adjustment speed of the countries to the shocks, relevant impulse-response functions and variance decomposition are also presented in this section. Section four introduces the functioning of monetary transmission mechanism and the differences among countries. Final section includes conclusions and implications.

2. Theory and Literature

2.1. OCA Theory: Criteria and Assessment in the Context of Asymmetric Shocks

The OCA theory represents the standard approach for assessing the cost side of the introduction of the common currency in the course of participating in a monetary union. The central bank of the monetary union cannot respond to local conditions. If monetary union is mainly exposed to symmetrical shocks or mechanisms for adjustment after asymmetrical shocks are in place, the common monetary policy is generally easy to implement. However, with the occurrence of asymmetric shocks, considerable costs can arise. Whether the introduction of a common currency and the transfer of monetary policy to a common central bank is associated with considerable costs or not can be answered with criteria of the OCA theory, which can be divided into traditional and modern criteria categories. The traditional criteria of labor mobility, flexibility of wages and prices, degree of openness, degree of diversification, fiscal transfer and type of shock are primarily treated as microeconomic criteria. In contrast, the modern criteria - capital mobility, business cycle, price stability, fiscal policy and political objectives are mainly macroeconomic (Peters, 2006).

According to the international factor mobility criterion specified by Mundell (1961), high labor mobility facilitates the adverse effects of asymmetric shocks. McKinnon (1963), who measures the openness of the country's economy with the ratio of the foreign trade goods to the total goods produced, stated that as the rate increases, the level of openness of the country will increase and thus the money field will be optimal. Kenen (1969) focused on product and export differentiation and accordingly, a country with high product and export differentiation can suffer less damage from asymmetric shocks. Kenen (1969), on the other hand, focused on "financial transfers" as the criterion to be used to neutralize asymmetric shocks in a currency region. The importance of the similarity of inflation rates in terms of OCA theory was emphasized by Haberler (1970) and Fleming (1971). According to this criterion, which is also stated by Corden (1972), the fact that member countries have different preferences regarding inflation will increase the cost of creating a common currency. The degree of real exchange rate variability was proposed by Vaubel (1976, 1978) as a criterion for the creation of a common currency. Should the real exchange rate between the two currencies be stable, the shocks that occur in these two countries do not require a real exchange rate change, so the cost of the two countries leaving their national currencies will be low (De Grauwe and Heens, 1993). The political integration will criterion was pointed out by Ingram (1969), Mintz (1970) and Tower and Willet (1976) as another important factor to create a common currency and was empirically supported by Cohen (1993). Ingram (1962) argued that in order to determine the optimum size of the currency area, it is necessary to focus on the financial characteristics of the economy, not the real one. Ingram (1962) argued that if there is a high degree of integration between financial markets, exchange rate changes will not be necessary because a small change in interest rates will cause sufficiently balancing capital movements. However, Fleming (1971) pointed out that even if the degree of financial integration is high, there may still be imbalanced capital movements (Özer, 2017).

The distinguishing characteristic of capital mobility developed by Scitosky (1967) is closely related to the Mundell criterion of the mobility of labor. The basis of this approach is the question of the extent to which the necessary adjustment process between the countries takes place through corresponding capital flows after a foreign trade disruption, so that the mechanism of the exchange rate can be abandoned with in the case of a fixed rate strategy. The optimality of a fixed exchange rate peg between two economies requires that the capital factor reacts to international yield differences, and thus the current account balance balances the current account balance through capital transfers. The criterion of capital mobility for assessing the costs of fixed versus flexible exchange rates therefore says: The higher the mobility of the capital factor, the more difficult it is to maintain a fixed but adaptable exchange rate regime. In the case of total capital mobility, an institutionally secured fixed exchange rate regime or completely flexible exchange rates are preferable (Konrad, 2002).

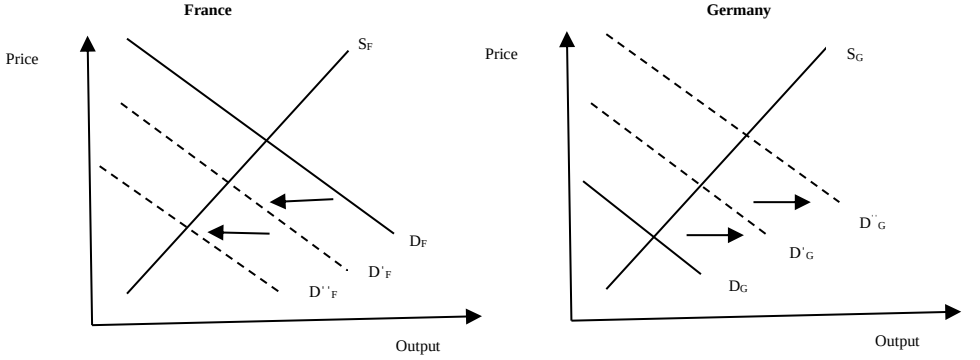
First of all, Magnifico (1971) first emphasizes that those countries that decide among themselves to fix their currencies should have an equal economic cycle. Conversely, if there are sustainable fluctuations in business cycles in a fixed exchange rate system and consequently cyclical differences in external balances, exchange rate adjustments will be necessary.

For classical reasons, the long run aggregate supply curve will be in vertical direction. The demand curve slope is downward and the short-run aggregate supply curve is upward. As a result of the effect of a demand shock, the demand curve changes its position and shifts upward. The impact is increase in both output as well as prices. However, as the aggregate supply curve becomes increasingly vertical over the course of economy, the economy steadily moves from its short-run equilibrium to its new long-run equilibrium position, and as a result, restoring the old level of output. The response to a lasting (positive) demand shock is thus a short-term rise in output tied with a permanent price rise. However, as a result of a positive supply shock, both the long run and short run supply curves shift their positions to outward. In the short run, this raises output and consequently reduces prices. This implies a further fall in prices and respectively an additional increase in output. As long as the magnitude of the shock and the transmission of the shock are similar in each country, few costs will be entailed by a single monetary policy. Contrasting with demand shocks, supply shocks result in lasting positive changes in output and opposite impact in prices changes. In this case, however, the transmission mechanisms plays important role. If the demand and supply curves are steep and while supply is price elastic in the longer term, then most of the adjustment will occur through prices. The situation is as for demand shocks. Symmetry and the transmission of shocks in a monetary union will suggest that a single monetary policy fits best. However, if the demand and supply curves are flatter and supply price is inelastic during the course of the economy, then most of the adjustment will be made via output. In that case, considering that output may need to be stabilized as well as prices and if the supply shocks are equally important as the demand shocks, there will be a need for additional policies (fiscal or supply side). In either case, if countries differ either in the magnitude of their shocks or in the transmission of those shocks, a single monetary policy will necessitate significant costs (Demertzis et al., 1997: 169-171). If two countries are hit by the same harsh shock and if these shocks are similar to nature, there is no necessity for their bilateral exchange rate to change. However, in the presence of an asymmetric shock, the situation is very different. As an example, if country A is hit by an adverse shock but not country B, in this case country A must undergo real depreciation. For example, the effect that will occur when France and Germany encounter an asymmetric demand shocks with the monetary union formations are shown in Figure 1.

The effect can be explained by taking into account the budget results. The negative demand shock in France results in a decrease in production and employment. Firstly, the decrease in government tax revenues emerges as a result of the decrease in French GDP. The second is this: With the increase in unemployment, the spending of the French government will increase. Considering these two effects, it can be concluded that the French government's budget deficit will increase. When the drop in aggregate demand is strong enough, the increase in the budget deficit of the French government can be so great that investors may have doubts about the solvency of the French government. This mistrust of the French government will lead investors to sell French government bonds. This will lead to an increase in the interest rate and a liquidity crisis. The macroeconomic consequences of this crisis develop as follows: the aggregate demand curve in France shifts to the left, and with a higher interest rate in France, French residents will spend less on consumer and

investment goods. Thus, the effect of the first negative demand shock increases as a result of the debt crisis. This effect is seen in Figure 1. In Germany, a positive demand shock emerges, and the effect is the opposite of that in France. Thus, the effect of the first negative demand shock increases as a result of the debt crisis. This effect is seen in Figure 1. In Germany, a positive demand shock emerges, and the effect is the opposite of that in France. These results reveal adjustment problems in two countries (de Grauwe, 2016: 11).

Figure: 1
Amplification of Asymmetric Shocks



Source: De Grauwe (2016), 10-12.

The 2008 global economic crisis and the high debts of the EU's member states caused financial instability and debt insolvency across the EU, especially in the EMU. Thus, due to the absence of compulsory fiscal policies, time-consistent policies and a common decision mechanism on the financial side, that is, there is no transnational mechanism such as the Common Fiscal Policy, fiscal discipline at the union level could not be achieved. This leaves the EU with unsustainable debts and financial unsustainability. In principle, it is possible to troubleshoot of the incomplete EMU and reduce costs by creating a two-way mechanism. The first concerns the role of the common central bank, where liquidity crises can be prevented. The second mechanism involves centralizing national budgets to a common union budget, which enables the use of a common fiscal policy. This means that there is a monetary union with a fiscal union. Two important things can be accomplished with such a fiscal union. First, it acts as an "insurance mechanism" that initiates the transfer of income from one welfare country to another country facing the crisis. This will reduce the impact on the country exposed to negative shock. Second, which is called "protection mechanism" the fiscal union will protect its members from liquidity crises and forced defaults by allowing the consolidation of national government debts. In monetary unions that do not have a fiscal union, national governments are vulnerable to liquidity crises and movements leading to forced default. In principle, this problem can be solved by creating a fiscal union. With the creation of the fiscal union, the "incomplete monetary union" will turn into "complete monetary union" (de Grauwe, 2016: 17-19).

2.2. Literature Review

Bayoumi and Eichengreen (1993) have examined economic shocks and their effects in European Community (EC) countries and the US regions by benefiting from Blanchard and Quah (1989) procedure. Their findings were correlation of shocks within the core countries of EC is more similar than within periphery and cores. Mikek (2009) analyzed correlation of the demand and supply shocks between the three essential countries of the EMU and New Member States (NMS - Estonia, Latvia, Lithuania, Poland, Czech Republic, Hungary, Slovakia and Slovenia) and came to the conclusion that main structural shocks among these countries have not changed considerable and particularly demand shocks persisted asymmetric.

De Grauwe and Mongelli (2004) suggested that member states are faced with two kinds of costs when they enter a monetary union. One stems from the fact that in the case of permanent shocks, relative price changes can become more challenging when these countries are members of a monetary union. The second source of cost stems from the fact that these countries lose their ability to use an independent monetary policy to stabilize the business cycle.

Ramos and Suriach (2004) highlighted some important aspects of macroeconomic shocks of the European enlargement that shows monetary policies in participating countries seem to be closely influenced by the monetary conditions in the euro area. In such a case, the costs of losing monetary independence will decrease when countries join the euro area.

De Santis and Cesaroni (2016) analyzed the determinants of current account disequilibrium in the Eurozone focusing on the role of financial integration. They found different effects of financial integration on the periphery and core countries and these effects have even increased after the euro came into existence, thus creating asymmetric shocks within the Eurozone. Behaviors from different Eurozone countries, which have very different economic, social and political structures, threaten the presence of a single currency (Boltho & Carlin, 2012).

Fidrmuc and Korhonen (2003) found that the supply shocks of the Austria and Benelux countries and also Portugal, Italy are highly correlated with the whole Euro area. They also found that supply shocks is generally higher than correlations of demand shocks. Frenkel and Nickel (2005) by inputting quarterly output and price data into their analyses for 22 European countries found that there are significant asymetric shocks in the central and eastern European countries. The adjustment process to shocks between the euro area and CEECs are also differentiated.

The literature on the importance of differences in financial and industrial structures as well as in the institutional setups implies that changes in the monetary policy have different effects in member countries. The same change effect is true for differences in the banking systems and the varying importance of bank credit in the financing of private firms, in collateral requirements and in the balance sheet of households (Gros & Hefeker, 2004).

In this respect, Mihov (2001) says "*monetary policy actions are transmitted differently to countries or regions within such an area, when because of structural and institutional differences; a given increase in interest rate has very different effects*."

De Grauwe and Ji (2013) suggested that countries within a monetary union are more sensitive to self-fulfilling liquidity crises when compared to countries that are not members of any monetary union. The European sovereign debt crisis occurred, specifically in the EMU so-called peripheral countries like Greece, Portugal, Ireland, Italy, Spain and Cyprus. During this period these countries faced a crisis "*the collapse of financial institutions, high government debt and rapidly rising bond yield spreads in government securities"* ("Investopedia Financial Dictionary", n.d.). However, many studies mention the contagion effect among these countries (Arghyrou & Kontonikas, 2012; Mink & De Haan, 2013). Fingleton, Garretsen and Martin (2015) demonstrated that the common negative shock in the Eurozone has the greatest influence on the peripheral regions (Ireland, Spain, the Baltic states and Greece) and some regions of Eastern Europe.There are numerous studies that show the origin and spread of the European sovereign debt crisis that can be attributed to the original design of the euro. The fragility of a monetary union is not fully understood under crisis conditions, particularly when there are no banking unions and other buffering mechanisms at the European level (Lane, 2012; De Grauwe, 2012). Eichengreen (2014) highlighted that the initial design of the Euro was imperfect and incomplete since the analytical framework of the monetary union (optimal currency area) was wrong and incomplete. It ignored the role of banks and capital flows in generating asymmetric shocks. It needed a multilateral oversight process that focuses not only on budget deficits but also on credit explosions, capital movements and current imbalances. Due to the limited contribution of capital flows to consumption smoothing, the effect of capital mobility on correcting asymmetric shocks has not attracted much attention. However, this factor is gaining increasing importance as financial integration between countries has deepened in recent times (Ricci, 2008).

Loužek (2015) argued that the Eurozone is not created as an optimal currency area in line with economic theory and rationality; politics are also influential in the formation of this area. Bak and Maciejewski (2015) pointed out that over the last decade, Eurozone members have shown a significant differentiation in economic structures, trade cycle synchronization and efficiency levels. These divergence trends have been reinforced by the 2008 global financial crisis and continue to be found in the EMU which call for reforms and new policies. De Haan, Inklaar and Jong-A-Pin (2008) concluded that the business cycles in the Eurozone have gone through, both convergence and declining periods. Nevertheless, there is some evidence in the 1990s that business cycle synchronization in the euro area has increased. It is clear from the evidence that higher trade intensity leads to more synchronization. Campos and Macchiarelli (2016) analyzed whether the EMU strengthens the core-periphery pattern and demonstrated that the core-periphery pattern weakens over time implying that synchronization is increasing.

3. Empirical Analysis: Data, Estimation -Structural VAR (SVAR) and Findings

We examine the macroeconomic shocks and their effects in some geographical areas of the EU for the pre-crisis period 1980-2004. By choosing this period, the developments before the 2007-2008 financial crisis will be better explained. Because, from this period, there will be a structural break in the economies. Thus, the economic conditions of the countries analyzed before the 2007-2008 global financial crisis and the EU debt crisis in 2009 can be evaluated in the context of OCA. We estimate a model using the procedure proposed by Bayoumi and Eichengreen (1993,1994) and Bayoumi and Thomas (1995). Bayoumi and Eichengreen and Bayoumi and Thomas use a procedure proposed by Blanchard and Quah (1989) for distinguishing temporary from permanent shocks to a pair of time-series variables.

3.1. The Model

Let Δy_t and Δx_t denote the change in output and the change in prices, which were calculated as the difference of the logarithm of real GDP and the implicit GDP deflator.

$$X_t = \begin{bmatrix} \Delta Y_t \\ \Delta P_t \end{bmatrix}$$

The basic form of VAR can take form as follows:

$$BX_t = \Gamma_0 + \Gamma_1 X_{t-1} + \Gamma_2 X_{t-2} + \ldots + \Gamma_m X_{t-m} + \varepsilon_t \quad (1)$$

This equation of (1) is the basic form of VAR model. Premultiplication by B^{-1} allows us to obtain the vector autoregressive (VAR) model in standard form:

$$X_t = B^{-1}\Gamma_0 + B^{-1}\Gamma_1 X_{t-1} + B^{-1}\Gamma_2 X_{t-2} + \ldots + B^{-1}\Gamma_m X_{t-m} + B^{-1}\varepsilon_t$$

$$X_t = A_0 + A_1 X_{t-1} + A_2 X_{t-2} + \ldots + A_m X_{t-m} + e_t$$

or in the equivalent form:

$$y_t = a_{10} + a_{11} y_{z-1} + a_{12} z_{t-1} + e_{1t} \quad (2)$$

$$z_t = a_{20} + a_{21} y_{z-1} + a_{22} z_{t-1} + e_{2t} \quad (3)$$

where e_t represents the residuals from the equations in the VAR. In the case being considered, e_t is comprised of the residuals of a regression of lagged values of Δy_t and Δp_t on current values of each in turn. $B_{ij}(L)$ are polynomials in the lag operator L such that the individual coefficients of $B_{ij}(L)$ are denoted by $b_{ij}(m)$.

The equations in (2) and (3) are called a SVAR in standard form. The error terms are composites of the two shocks ε_{dt} and ε_{st}. We can use OLS to estimate the SVAR. Using OLS we can obtain the estimated shocks: e_{yt} and e_{pt}. Since $e_t = B^{-1}\varepsilon_t$, using this formula we can

estimate ε_{dt} and ε_{st}. Consider a system where the true model can be represented by an infinite moving average representation of a vector of variables X_t, and an equal number of shocks, ε_t. Using the lag operator L, this can be written as:

$$X_t = [(I + A_0) - A(L)\ ]^{-1} e_t$$

$$X_t = [(I + A_0 - I + A(L) + A(L)^2 + \dots\ ] e_t$$

$$X = B_0 e_t + B_1 e_{t-1} + B_2 e_{t-2} + B_3 e_{t-3} + \dots$$

$$X_t = \sum_{i=0}^{\infty} L^i B_i \varepsilon_t$$

It can also be written in matrix form:

$$\begin{bmatrix} \Delta y_t \\ \Delta p_t \end{bmatrix} = \sum_{i=0}^{\infty} L^i \begin{bmatrix} b_{11i} & b_{12i} \\ b_{21i} & b_{22i} \end{bmatrix} \begin{bmatrix} \varepsilon_{dt} \\ \varepsilon st \end{bmatrix}$$

where y_t and p_t represent the natural changes of logarithms of output and prices, ε_{dt} and ε_{st} are independent supply and demand shocks. "*The framework implies that while supply shocks have permanent effects on the level of output, demand shocks only have temporary effects. Both have permanent effects upon the level of prices".* Writing $e_t = B\varepsilon_t$, it is clear that, in the two-by-two case considered, four restrictions are required to define the four elements of the matrix B. Two of these restrictions are simple normalizations, which define the variance of the shocks ε_{dt} and ε_{st}. A third restriction comes from assuming that demand and supply shocks are orthogonal. The final restriction, which allows the matrix B to be unique, is that demand shocks have only temporary effects on output. It can be shown as follows (Enders, 1995: 334).

$$\sum_{i=0}^{\infty} b_{11}(i)\varepsilon_{dt-i} = 0$$

Enders says that, an especially useful feature of the Blanchard and Quah technique is that it provides a unique decomposition of an economic time series in to its temporary and permanent components (Enders, 1995: 343).

3.2. Data

We use annual data for 1980-2004 taken from the International Financial Statistics CD-ROM of the International Monetary Fund and from the web site of State Planning Organization of the Republic of Turkey. The data were collected for these selected countries, whose data are available for the specified period: Austria (AUS), Belgium (BEL), Denmark (DEN), Finland (FIN), France (FR), Germany (GER), Greece (GR), Italy (IT), the Netherlands (NET), Hungary (HUN), Poland (POL), Portugal (POR), Ireland (IR), Malta (MAL), Romania (ROM), Spain (SP), Sweden (SW), Turkey (TUR) and the United Kingdom (UK). For each country growth and inflation were calculated as the first difference

of the logarithm of real GDP and the implicit GDP deflator. The GDP deflator is used to measure prices since it reflects the price of output rather than the price of consumption.

Table 1 and 2 report correlation coefficients between GDP growth and inflation for different countries. We have calculated a critical value for positive correlations ($\rho=0$) of 0.47.

The correlation coefficient ρ can be defined as

$$\rho= \text{cov}\,(x,y)/(\sigma_x\sigma_y)$$

ρ is a symmetric function of x and y, as any coefficient of interdependence should be. Since it is a homogenous function of moments about the means, it is invariant under changes of origin and scale. When cov (x,y) =0, $\rho=0$. If there is no correlation across equations ($\rho=0$), the residuals from x_t and y_t equations are necessarily equivalent to the shocks (Kendall & Stuart, 1967: 287).

The standard deviations and means indicate that output fluctuations have generally been somewhat smaller across countries than inflation fluctuations. It is also obvious that Turkey experienced relatively inconsistent economic development in comparison with other countries. Specifically, inflation variability of Turkey is even much higher in this period compared to transition countries such as Romania, Poland and Hungary. If we shift attention towards the UK, there are not any differences compared to other countries. Using standard deviations and means of growth and the deflator, one can divide the countries into five groups. The first group includes Austria, Belgium, Germany, Denmark, the Netherlands, France, and Finland. This group shows much smaller fluctuations of growth and inflation. The second group includes Greece, Spain, Italy, the UK, Ireland and Sweden. The third group of countries is the countries consist of Poland, Hungary and Romania, which have all experienced transformation disturbances. The fourth group includes Portugal. The fifth group includes only Turkey, in which growth and inflation variability are relatively high.

Table 1 and 2 show us the correlation coefficient of growth and the deflator for each country. These tables show us that a core of five countries (Austria, Belgium, France, Germany, Finland, and the Netherlands) have growth and deflator rates that are highly correlated both within the group and with other European countries. The other group (Denmark, Spain, Sweden, Italy and the United Kingdom) have relatively high correlations with the core countries, but not with other countries. In comparison with growth correlations, cross-country correlations of European inflation rates do not suggest the existence of clearly defined country groups. It is obvious that Turkey does not have, both in growth and in inflation, almost any significant correlations with other countries. East European countries (Poland, Hungary and Romania) have also hardly any significant correlations both in growth and in inflation, because there have been important economic structural changes in these countries.

Table: 1
Correlations of Deflators across Different Geographic Regions

	DLN AUS DEF	DLN BEL DEF	DLN DEN DEF	DLN FIN DEF	DLN FR DEF	DLN GER DEF	DLN GR DEF	DLN HUN DEF	DLN IR DEF	DLN IT DEF	DLN MAL DEF	DLN NET DEF	DLN POL DEF	DLN POR DEF	DLN ROM DEF	DN SP DEF	DLN SW DEF	DLN TUR DEF	DLN UK DEF
DLN AUSDEF	1																		
DLN BELDEF	**0.56**	1																	
DLN DENDF	**0.70**	**0.57**	1																
DLN FINDEF	**0.60**	**0.63**	**0.83**	1															
DLN FRDEF	**0.74**	**0.66**	**0.94**	**0.82**	1														
DLN GERDEF	**0.67**	0.45	0.39	0.30	0.44	1													
DLN GRDEF	**0.47**	**0.48**	**0.48**	**0.66**	**0.52**	**0.54**	1												
DLN HUNDF	-2.88E-17	-0.19	-0.50	-0.44	-0.50	0.24	-0.04	1											
DLN IRDEF	**0.55**	**0.49**	**0.88**	**0.73**	**0.88**	0.25	0.25	-0.57	1										
DLN ITDEF	**0.73**	**0.63**	**0.94**	**0.89**	**0.94**	**0.48**	**0.65**	-0.42	**0.83**	1									
DLNMAL DEF	0.21	-0.07	0.14	0.08	0.13	0.33	0.08	0.07	0.12	0.06	1								
DLN NETDEF	0.45	**0.48**	**0.49**	0.38	**0.48**	0.24	0.07	-0.26	**0.65**	0.46	0.07	1							
DLN POLDEF	0.03	0.22	0.22	0.27	0.05	0.23	0.42	0.36	0.02	0.20	0.09	0.01	1						
DLN PORDEF	0.39	0.43	**0.62**	**0.67**	**0.65**	0.35	**0.64**	-0.51	0.43	**0.70**	0.05	-0.02	0.13	1					
DLN ROMDF	-0.06	-0.20	-0.51	-0.61	-0.41	0.26	-0.27	0.65	-0.39	-0.49	0.24	-0.12	-0.17	-0.50	1				
DLN SPDEF	**0.75**	**0.60**	**0.81**	**0.76**	**0.86**	**0.52**	**0.57**	-0.32	**0.65**	**0.84**	0.11	0.21	0.20	**0.79**	-0.42	1			
DLN SWDEF	0.30	0.09	**0.62**	**0.64**	**0.51**	0.16	0.53	-0.25	0.45	**0.65**	-0.04	0.12	**0.48**	**0.62**	-0.64	**0.54**	1		
DLN TURDEF	-0.29	-0.25	-0.61	-0.43	-0.57	-0.24	-0.22	**0.66**	-0.58	-0.59	0.24	-0.28	0.09	-0.62	**0.51**	-0.53	-0.47	1	
DLN UKDEF	**0.62**	0.41	**0.69**	**0.70**	**0.60**	**0.57**	**0.67**	-0.05	**0.56**	**0.77**	0.25	**0.52**	**0.51**	0.40	-0.32	**0.52**	**0.67**	-0.29	1

Source: Own Calculations.

Table: 2
Correlations of GDP's across Different Geographic Regions

	DLN AUS GDP	DLN BEL GDP	DLN DEN GDP	DLN FIN GDP	DLN FR GDP	DLN GER GDP	DLN GR GDP	DLN HUN GDP	DLN IR GDP	DLN IT GDP	DLN MAL GDP	DLN NET GDP	DLN POL GDP	DLN POR GDP	DLN ROM GDP	DLN SP GDP	DLN SW GDP	DLN TUR GDP	DLN UK GDP
DLNAUS GDP	1																		
DLNBEL GDP	**0.59**	1																	
DLNDEN GDP	0.08	0.19	1																
DLNFIN GDP	0.18	0.25	0.40	1															
DLNFR GDP	0.28	**0.51**	0.08	**0.49**	1														
DLNGER GDP	0.38	0.36	-0.10	-0.42	0.003	1													
DLNGR GDP	0.27	**0.54**	0.33	0.39	**0.55**	0.15	1												
DLNHUN GDP	-0.16	0.16	0.33	**0.80**	0.44	-0.74	**0.31**	1											
DLNIR GDP	0.40	**0.59**	0.15	**0.48**	0.40	-0.08	**0.65**	0.44	1										
DLNIT GDP	0.28	**0.55**	**0.43**	0.27	0.43	**0.51**	**0.48**	0.10	0.26	1									
DLNMAL GDP	**0.48**	0.45	-0.16	0.03	0.34	**0.49**	0.17	-0.21	0.32	0.31	1								
DLNNET GDP	**0.59**	**0.58**	0.46	0.25	0.20	0.36	0.38	-0.02	0.41	**0.56**	0.20	1							
DLNPOL GDP	-0.03	0.30	**0.59**	**0.49**	0.16	-0.25	**0.38**	**0.52**	**0.36**	0.23	0.06	0.26	1						
DLNPOR GDP	**0.70**	**0.72**	0.10	0.23	**0.50**	0.24	**0.40**	0.15	**0.49**	0.39	**0.47**	0.41	-0.03	1					
DLNROM GDP	-0.40	-0.39	0.38	0.39	-0.07	-0.67	-0.06	**0.55**	-0.05	-0.10	-0.39	-0.23	**0.34**	-0.34	1				
DLNSP GDP	**0.64**	**0.61**	0.24	**0.53**	**0.54**	0.32	**0.61**	0.25	**0.61**	**0.67**	0.29	**0.55**	0.16	**0.63**	-0.20	1			
DLNSW GDP	-0.18	-0.05	0.27	0.34	3.10E-17	-0.14	-0.08	0.25	0.19	0.19	0.09	0.12	**0.49**	-0.38	0.42	4.60E-17	1		
DLNTUR GDP	-0.05	-0.2	-0.24	0.11	-0.09	-0.15	-0.43	-0.03	-0.16	-0.29	0.20	-0.36	0.06	-0.29	0.08	-0.12	0.23	1	
DLNUK GDP	0.10	0.16	**0.71**	**0.59**	0.28	-0.29	0.23	**0.60**	0.10	0.42	-0.08	0.31	**0.73**	0.09	**0.53**	0.32	0.46	0.007	1

Source: Own Calculations.

Table: 3
Correlations of Demand Shocks across Different Geographic Regions

	DEM AUS	DEM BEL	DEM DEN	DEM FIN	DEM FR	DEM GER	DEM GR	DEM HUN	DEM IR	DEM IT	DEM MAL	DEM NET	DEM POL	DEM POR	DEM ROM	DEM SP	DEM SW	DEM TUR	DEM UK
DEM AUS	1																		
DEM BEL	0.18	1																	
DEM DEN	0.15	0.24	1																
DEM FIN	**0.29**	**0.52**	0.12	1															
DEM FR	0.26	0.16	-0.03	-0.15	1														
DEM GER	-0.24	-0.14	0.05	-0.08	0.27	1													
DEM GR	0.24	**0.38**	-0.15	**0.36**	-0.02	-0.30	1												
DEM HUN	0.21	0.06	0.20	**0.51**	-0.02	**0.36**	0.20	1											
DEM IR	-0.36	0.23	0.14	-0.02	0.24	0.12	-0.22	-0.40	1										
DEM IT	0.14	-0.27	0.28	-0.36	0.10	0.21	-0.46	-0.17	0.20	1									
DEM MAL	-0.08	-0.19	-0.10	-0.03	0.20	**0.36**	-0.61	0.10	-0.05	0.06	1								
DEM NET	0.04	0.23	0.17	0.29	-0.13	-0.20	0.09	-0.06	0.04	-0.21	-0.19	1							
DEM POL	0.11	**0.31**	0.25	**0.42**	-0.22	-0.12	**0.29**	0.31	0.13	-0.07	-0.55	0.28	1						
DEM POR1	-0.08	-0.28	0.00	-0.16	-0.01	-0.18	0.09	-0.22	-0.08	-0.46	0.06	-0.01	-0.10	1					
DEM ROM	-0.09	-0.07	-0.09	-0.17	**0.49**	0.22	-0.13	-0.11	0.15	0.16	-0.01	-0.02	-0.32	-0.35	1				
DEM SP	**0.46**	0.02	**0.43**	0.27	0.06	-0.16	0.15	0.14	-0.22	-0.13	0.07	0.06	0.16	**0.52**	-0.26	1			
DEM SW	-0.28	0.11	0.14	0.03	-0.08	0.02	0.14	-0.03	0.21	0.06	-0.27	-0.16	0.17	-0.21	0.09	0.06	1		
DEM TUR	0.20	**0.30**	-0.06	**0.34**	0.27	-0.01	0.23	0.27	-0.29	-0.20	0.20	**0.47**	0.07	-0.17	-0.04	-0.02	-0.23	1	
DEM UK	0.19	0.06	0.03	0.13	-0.08	-0.35	0.07	0.25	-0.35	0.05	0.10	0.11	-0.19	-0.21	-0.14	-0.13	-0.25	**0.37**	1

Source: Own Calculations.

Table: 4
Correlations of Supply Shocks across Different Geographic Regions

	SUP AUS	SUP BEL	SUP DEN	SUP FIN	SUP FR	SUP GER	SUP GR	SUP HUN	SUP IR	SUP IT	SUP MAL	SUP NET	SUP POL	SUP POR	SUP ROM	SUP SP	SUP SW1	SUP TUR	SUP UK
SUP AUS	1																		
SUP BEL	**0.30**	1																	
SUP DEN	-0.19	**0.30**	1																
SUP FIN	0.15	0.25	0.28	1															
SUP FR	0.14	0.24	-0.03	**0.60**	1														
SUP GER	0.11	0.09	-0.06	-0.32	-0.07	1													
SUP GR	0.13	**0.55**	**0.37**	0.25	**0.45**	0.28	1												
SUP HUN	-0.06	0.21	0.27	**0.64**	**0.39**	-0.67	0.09	1											
SUP IR	0.08	**0.53**	0.17	**0.41**	**0.36**	-0.35	**0.45**	0.31	1										
SUP IT	-0.11	**0.52**	**0.37**	0.05	0.28	**0.43**	**0.60**	-8.13e-05	0.18	1									
SUP MAL	0.22	**0.42**	0.25	0.12	0.22	**0.34**	**0.63**	-0.01	0.21	**0.53**	1								
SUP NET	**0.37**	**0.50**	0.31	0.18	0.04	**0.30**	0.31	-0.10	**0.29**	0.28	0.06	1							
SUP POL	-0.10	0.06	**0.32**	0.24	0.01	0.13	0.15	0.01	0.14	0.17	**0.47**	0.11	1						
SUP POR	**0.52**	**0.74**	0.28	0.11	0.07	0.10	**0.36**	0.14	0.28	0.36	0.23	**0.60**	-0.14	1					
SUP ROM	-0.25	-0.34	0.03	0.09	0.12	-0.47	-0.27	0.30	0.04	-0.14	-0.17	-0.31	-0.25	-0.34	1				
SUP SP	**0.30**	**0.41**	0.13	**0.60**	**0.45**	0.19	**0.44**	0.14	0.35	**0.44**	0.12	**0.57**	0.07	**0.50**	-0.26	1			
SUP SW	-0.21	-0.27	0.24	0.18	0.01	-0.18	-0.09	-0.01	0.15	0.03	0.13	-0.27	0.14	-0.41	0.34	-0.04	1		
SUP TUR	0.15	-0.33	-0.30	0.23	-0.03	-0.14	-0.24	0.05	-0.03	-0.28	0.21	-0.31	0.16	-0.41	0.06	-0.01	0.52	1	
SUP UK	0.18	0.13	**0.38**	**0.60**	**0.38**	-0.14	0.036	**0.38**	-0.18	0.10	0.26	-0.11	0.11	0.14	0.27	0.24	0.24	0.15	1

Source: Own Calculations.

3.3. Estimation Results (Findings)

3.3.1. Correlation of Supply Disturbances

Table 4 shows the correlation of supply disturbances between countries. The results show that Belgium, Greece, Spain and the Netherlands have highly correlated coefficients with other countries. The correlation coefficients of Austria, Finland, France, the United Kingdom, Portugal, Italy and Denmark are also significant in comparison with other countries, but these countries do not have as many significant coefficients as the first group. However, Turkey has no significant correlation coefficient.

3.3.2. Correlation of Demand Disturbance

Table 3 shows the correlation of demand disturbances between countries. Demand disturbances include the impact of monetary and fiscal policies, and therefore they are less likely than supply disturbances. Finland, Spain and Belgium have the most significant coefficients, while Ireland, Italy and Sweden do not have any significant correlation coefficients with other countries. It is important to stress that although the United Kingdom has relatively more significant supply correlations, it does not have any significant demand correlations with the core countries of the EMU. Table 3 shows that Turkey has significant correlation coefficients with Finland, the UK, Belgium and the Netherlands. If we take Belgium and Austria into consideration, we can observe that Belgium has more significant correlations, both in demand and in supply. Looking at Table 3 and 4 we suggest that demand disturbances looks more crucial than supply shocks within Europe.

3.3.3. Size of Disturbances

In addition to providing estimates on the correlation of disturbances, these methods also convey information about the size and the speed at which the respective economies adjust. Table 5 and 6 show us the size of supply and demand shocks. For the supply disturbances, an obvious measure is the long-run output effect, which measures the shift in potential supply. For demand disturbances, the sum of the first-year impact on output and prices, which measure the short run change in nominal GDP, is calculated as a measure of size.

The larger the disturbances, the more disruptive will be their effects and the greater the premium that will be placed on instruments (such as monetary policy) that might be used to offset them. Similarly, it is shown that the slower the response of an economy to disturbances, the larger the costs of permanently fixing the exchange rate and of foregoing policy autonomy. These tables show us that Greece has the largest supply shocks, while Turkey has the largest demand shocks. Turkey has such large demand disturbances that it cannot be compared with other countries. In comparison with other countries the Netherlands, Malta, France, the United Kingdom, Austria, Sweden and Germany have relatively smaller size of supply shocks. If we turn our attention to demand shocks, it is clear from the evidence that Germany, the Netherlands, Malta, Belgium, Austria, France and Sweden have smaller size of demand disturbances.

Table: 5
Size of Supply Shock

Countries	Size of Supply Shock
Netherlands	0.0062
Malta	0.0064
France	0.0068
UK	0.0068
Austria	0.0071
Sweden	0.0075
Germany	0.0079
Denmark	0.0116
Turkey	0.0135
Spain	0.0136
Belgium	0.0144
Portugal	0.0163
Italy	0.0179
Ireland	0.0213
Romania	0.0218
Finland	0.0236
Hungary	0.0333
Poland	0.0346
Greece	0.0492

Source: Own Calculations.

Table: 6
Size of Demand Shock

Countries	Size of Demand Shock
Germany	0.004
Netherlands	0.006
Malta	0.006
Belgium	0.008
Austria	0.010
France	0.010
Sweden	0.010
Spain	0.015
UK	0.015
Denmark	0.017
Italy	0.018
Ireland	0.022
Poland	0.024
Greece	0.032
Hungary	0.035
Finland	0.042
Portugal	0.061
Romania	0.073
Turkey	0.116

Source: Own Calculations.

3.3.4. Speed of Adjustment to Shocks

The procedure of Bayoumi and Eichengreen (1993, 1997) allows the responses of economies to shocks to be analyzed. This can be done by looking at the impulse response functions associated with the SVARs. A simple measure of the speed of adjustment is the ratio of the impulse-response function in the third year to its long run level. High value of this ratio indicates a fast adjustment while low value means a relatively slow adjustment. The speed of adjustment to demand and supply shocks for different countries are shown in Tables 7 and 8. Findings suggest that countries with a high debt burden face large supply and demand shocks. It is also clear that the speeds of adjustment of those countries compared with other countries are much lower.

It is clearly shown that the adjustment speed of demand disturbances of countries is slower than the adjustment speed of supply disturbances. Although the United Kingdom has the fastest speed of adjustment to supply disturbances, it has almost the slowest adjustment speed of the demand disturbances (Greece has the lowest adjustment speed followed by the United Kingdom). The results show that Greece is characterized by the slowest adjustment speed both to supply and demand disturbances. It is also important to say that Romania has a relatively rapid adjustment, although it has experienced a relatively large amount of demand and supply shocks. As the tables show, the Netherlands, Belgium, Austria, France and Germany exhibit the fastest adjustment compared to other countries. When we focus on Turkey, the results imply a relatively rapid adjustment to supply shocks. But in contrast, Turkey has a relatively slow adjustment to demand shocks. One reason is that the demand shocks include the impact of monetary and fiscal policies. These policies were implemented in Turkey to such an extent that they caused large disturbances in the economy.

Table: 7
Adjustment Speed to Supply Disturbances

Countries	Adjustment Speed of Supply Disturbances
UK	1.28
Romania	1.15
France	1.10
Portugal	1.06
Turkey	1.05
Austria	1.03
Italy	0.96
Germany	0.96
Belgium	0.89
Netherlands	0.87
Spain	0.88
Denmark	0.83
Finland	0.83
Hungary	0.82
Ireland	0.74
Poland	0.63
Malta	0.58
Sweden	0.22
Greece	0.07

Source: Own Calculations.

Table: 8
Adjustment Speed to Demand Disturbances

Countries	Adjustment Speed of Demand Disturbances
Netherlands	1.11
Belgium	1.02
Malta	0.99
Romania	0.89
Germany	0.81
Austria	0.76
Sweden	0.75
Poland	0.68
Ireland	0.66
Denmark	0.61
Spain	0.61
Turkey	0.57
France	0.56
Hungary	0.48
Finland	0.47
Italy	0.43
Portugal	0.32
UK	0.31
Greece	0.25

Source: Own Calculations.

3.4. The Impulse Response Functions

Here in this section, we want to show the impulse response functions (IRF) of GDP and the Deflator for each country. The IRF represents various shocks on GDP and the Deflator. An impulse response function describes the response of an endogenous variable to one of the innovations. Specifically, it traces the effect on current and future values of the endogenous variable of one standard deviation shock to one of the innovations. The IRF represents the behavior of the GDP and Deflator to the various shocks (Enders, 1995: 305).

We analyzed the responses of GDP's and the deflators of different countries to the supply and demand shocks (see appendix 1). Table 9 reports the maximum degree of responses for particular countries' GDP and deflator:

Table: 9
The Impulse Response Functions

Countries	The response of the deflator to the demand shocks (max. degree)	The response of GDP to the supply shocks (max. degree)
Austria (AUS)	0.0041	0.0051
Belgium (BEL)	0.0067	0.0098
Denmark (DEN)	0.0043	0.0072
Finland (FIN)	0.0072	0.0012
France (FR)	0.0031	0.0061
Germany (GER)	0.0047	0.0111
Greece (GR)	0.0126	0.0019*
Hungary (HUN)	0.0156*	0.0153
Ireland (IR)	0.0072	0.0105
Italy (IT)	0.0042	0.0052
Malta (MAL)	0.0082	0.0110
Netherlands (NET)	0.0041	0.0065
Poland (POL)	0.0035	0.0064
Portugal (POR)	0.0225	0.0119
Romania (ROM)	0.1211	0.0158
Spain (SP)	0.0086	0.0066
Sweden (SW)	0.0079	0.0041
Turkey (TUR)	0.0343*	0.0202
UK (UK)	0.0041*	0.0051

Source: Own Calculations.

** means that the maximum degree of response of the variable to the shocks is not seen in the first year.*

What is the source of these differences? Apparently, different structures of the economies (for example, contrary to the OCA theory, different diversified economies with different range of production and export sectors; different business cycle, different wage and price flexibility etc.). To avoid or minimize these differences, there are conditions for entry of any EU country in the EMU called 'convergence criteria'. The EMU was carefully mapped out in the Maastricht Treaty. It specified how and when the single currency would be started and laid down a precise set of institutional arrangements (Baldwin & Wyplosz, 2004: 380-382).

In the previous section we analyzed the standard deviations and mean of GDP and Deflator for some countries. It is clearly seen that Turkey has a large standard deviation of GDP and deflator. Using IRF it can be clarified that the responses of GDP and the deflator to the disturbances for Turkey are too large. The responses of GDP and deflator to one standard deviation innovations for the United Kingdom are not large, but volatile. That is, the economy of Turkey is susceptible to shocks and can be affected negatively from the monetary union. In addition, the membership of Turkey may bring an extra burden to the single monetary policy in the EURO area. However, one should note that that since 2001 Turkey has adopted the stability program.

Looking at the volatility and the intensity of responses, it is evident that the United Kingdom may be affected negatively from a monetary union and therefore proposed not to take part in a monetary union. The following is an investigation of the variance of decomposition for different countries (see appendix 2).

Shock1 means demand shock;

Shock2 means supply shock;

The following features of the variance decomposition stand out:

Austria - Both supply and demand shocks are important.

Belgium - Supply shocks are more important than demand shocks. Especially, prices are affected more from supply disturbances. But the huge preponderance of the variation in output is due to the supply-side shocks.

Denmark - Both supply and demand shocks are important.

Finland - Both supply and demand shocks are important.

France - Both supply and demand shocks are important. But supply shocks are a bit more important than demand shocks.

Germany - Supply-side shocks are more important than demand-side shocks. Especially, prices are affected more by supply disturbances. But the huge preponderance of the variation in output is due to supply-side shocks.

Greece - Supply disturbances are more important than demand disturbances. It is important to say that, supply disturbances effect prices more than demand disturbances. It is also important to stress that the GDP of Greece is more affected from demand side shocks.

Hungary - Supply-side disturbances are more important. It is clearly seen that supply shocks have a more important effect upon the GDP deflator.

Ireland - Demand-side shocks are more important.

Italy - Supply-side disturbances are more important.

Malta - Both supply and demand shocks are important.

The Netherlands - Supply shocks are more important.

Poland - Supply shocks are much more important than demand shocks. Specifically, demand shocks do not hardly have any effect on the GDP deflators.

Portugal - Both demand and supply shocks are important.

Romania - Demand-side disturbances are more important.

Spain - Supply shocks are more important.

Sweden - Both supply and demand shocks are more important. But demand-side disturbances are a bit more important in Sweden.

Turkey - Both supply and demand shocks are important.

UK - Demand-side disturbances are more important.

4. Conclusion and Implications

We considered the incidence of supply and demand shocks in some countries of the European Union as a way of identifying countries experiencing similar economic disturbances and hence satisfying one of the conditions for forming an optimum currency area. For Austria, Belgium, France, the Netherlands and Germany, the results show similar economic disturbances. Supply shocks to these countries were both smaller and more correlated across neighboring countries (Austria, Belgium, France, the Netherlands and Germany). The demand shocks experienced by these countries were also smaller and more correlated within the group. In addition, findings imply that Turkey (as today's negotiating country) does not seem to be ready (fit) for the EMU. Similar results are achieved for the United Kingdom, Sweden and Denmark (Full members but not in the EMU). For example, the adjustment speed to demand shocks in the UK is much lower compared to the member countries, but Sweden and Denmark against the supply irregularities are seen to have low

speed of adjustment. (This evidence looks confirmative for the choice of the UK, Sweden and Denmark to stay outside the EMU).

Our empirical results also explain well why the demand shocks for Turkey is so big and (is) so small for Germany. Naturally, the size of the demand shock critically depends on the monetary and fiscal policy of a country. We show (i.e. for four countries) that the same monetary policy can lead to different effects in different countries, if their transmission mechanisms are different, i.e., the expected effect in Turkey is different from what is in Germany.

Our findings suggest that the frequency of shocks faced by member countries, asymmetry, size and ability to adopt to shocks seem to be quite different from each other. The empirical evidence here shows that the EMU can not be called an Optimum Currency Area due to the differences in economic shocks across its member countries. However, in this study the findings also show that, Belgium, Austria, France, Germany and the Netherlands consist a core group. In light of these findings, it is clear that this core group is closer to an OCA.

Considering all the findings, we observe that those member countries which have fallen into debt problems after the 2008 global financial crisis (such as Greece, Portugal, Spain, Ireland) experienced the debt problems in deeper form (ie. debt crisis) and faced greater shocks when compared to other EU countries. Our results suggest that Greece is faced with the largest supply shock, whereas Portugal had the largest demand shock following Turkey and Romania. Results are also very similar for Spain, Ireland, and Italy. It is also clear from our findings that the adoption speed for the supply and demand irregularities of those countries with debt crisis (Greece, Portugal, Spain, Ireland, Italy) is very low. Compared to other countries, the size of supply and demand shocks faced by these countries (Greece etc.) gives us important clues about why these countries are dragged into the debt crisis. Countries with the high debt burden in the EMU seemed to drag into the debt crisis. Our evidence also confirms that their supply and demand shocks are high, as well as the speed of adjustment to these shocks are much lower when compared to other countries such as Belgium, Austria, France, Germany and the Netherlands. This explains why Greece is the most adversely affected member country from the global financial crisis.

In this context, the original value of this study is that it provides a valuable empirical contribution to the present OCA literature in the sense of asymmetric effects of the shockes. Empirically proved that countries affected by the global economic crisis and then the EU budget crisis face larger asymmetric shocks. In addition, it was concluded that the adjustment speed of these countries to shocks are lower compared to other countries. In this context, the importance of providing fiscal dicipline at the level of union is revealed. This study tests and shows the relationship between the importance of financial discipline and financial stability and the size of asymmetric shocks and the speed of adjustment to shocks in countries facing these shocks by the use of structural VAR analysis.

The findings of this paper confirm the urgent need for a complete EMU, that is the EMU with common fiscal policy, common banking and capital policy, in order to prevent possible asymmetric effects of the supply and demand shocks. In line with our findings and policy recomendations, the EU Comission has already initiated a credible plan effective from July, 2015 to 2025 to complete the EMU architecture. According to the plan of the Commission, the transformation of an incomplete EMU into a stronger (that is, complete) EMU will take place in two stages. During the "deepening by doing" phase, covering the period between July 1, 2015 and June 30, 2017, EU institutions and member states of the Eurozone already built on existing vehicles and used existing Treaties in the best possible way. In the second phase, which will be completed by the completion of EMU by 2025 at the latest, the economic and institutional architecture of EMU will be completed by taking concrete measures with a broader structure (Juncker et al., 2015). With the creation of a common fiscal policy, a common banking and capital policy (banking union), and a protection mechanism will be established against asymmetric shocks and the EMU will be completed. The plan ensures the integration of the European Stability Mechanism into the EU law framework in the context of the principles Democratic Accountability, Legitimacy and Institutional Strengthening by 2025. This means a responsible euro-zone treasure at the union level. Only if this is accomplished by 2025, then the EMU will not be said to be volnurable to the asymmetric effects of shocks.

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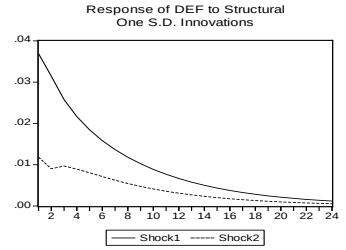
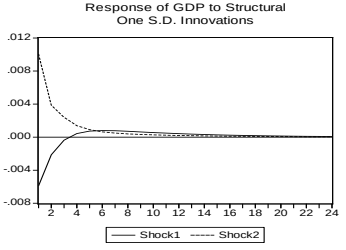
Appendix: 1
Response Functions of Deflator and GDP of Different Geographic Regions

All Countries as A Balanced Panel





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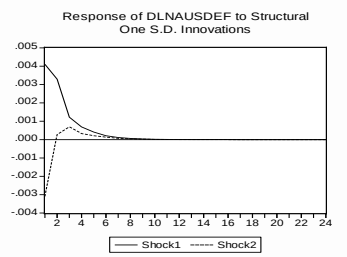

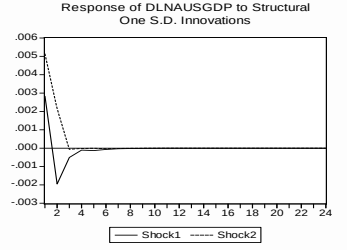

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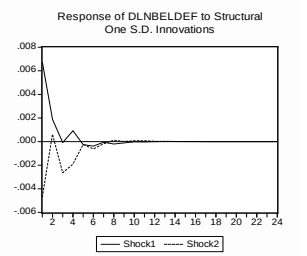

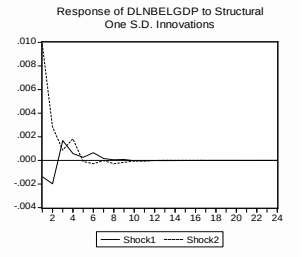

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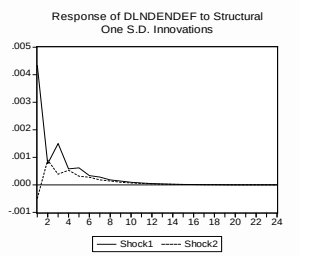

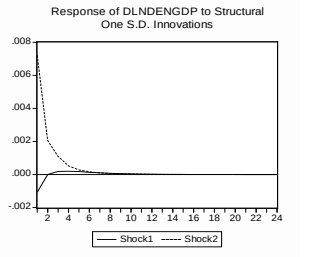

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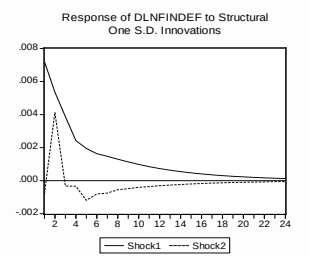

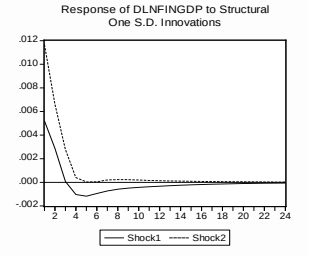

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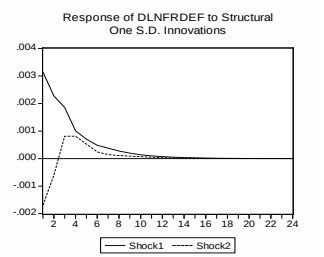
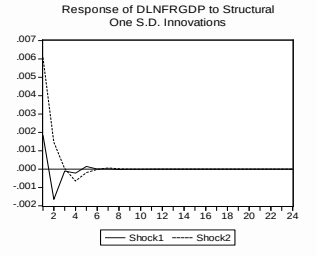
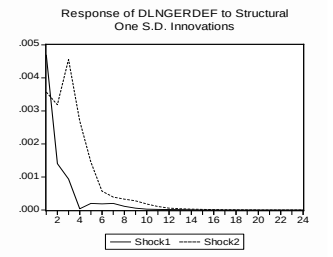
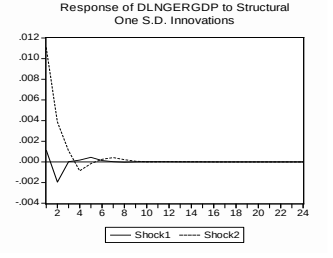


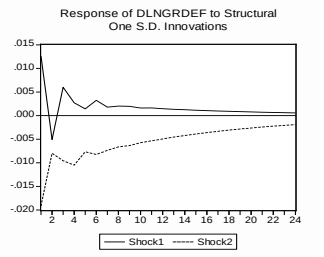


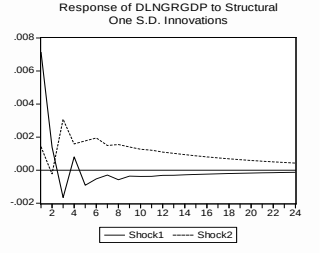
Germany





Greece





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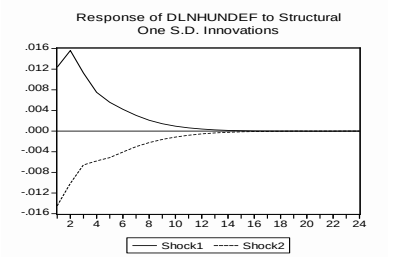
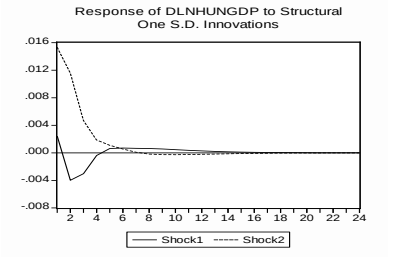
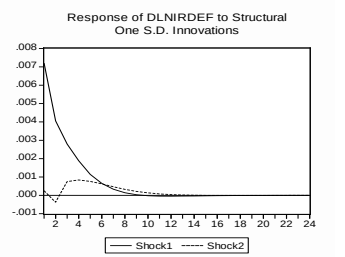
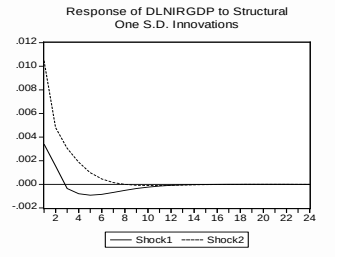


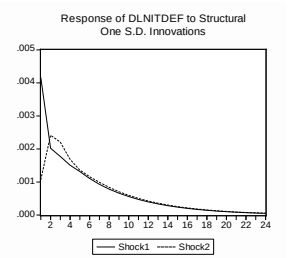


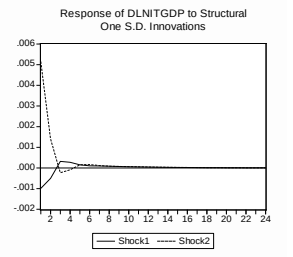
Ireland





Italy





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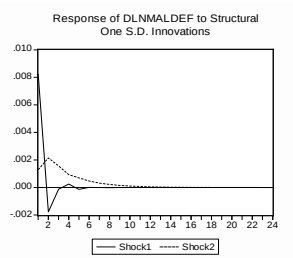
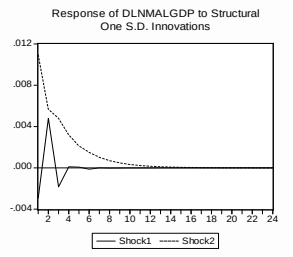
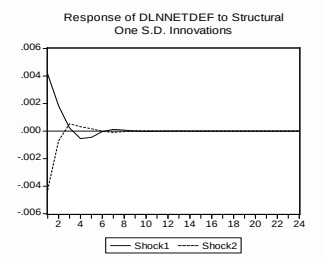
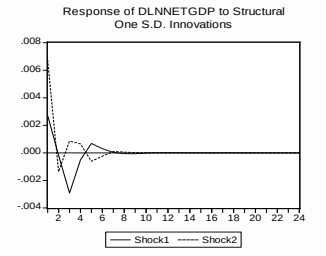




Netherlands





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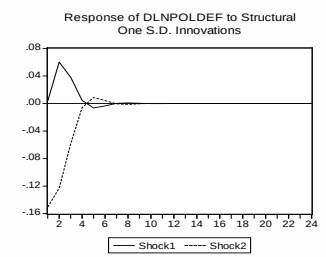

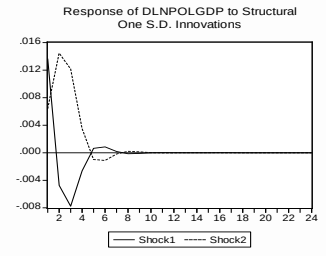

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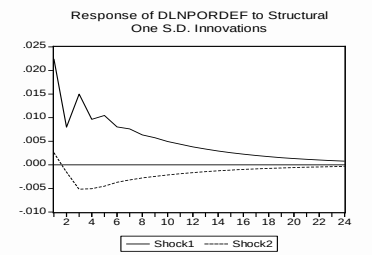
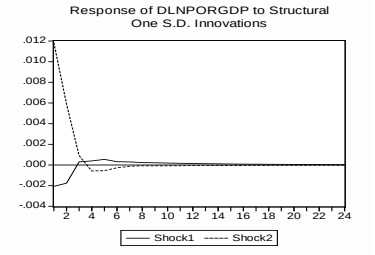
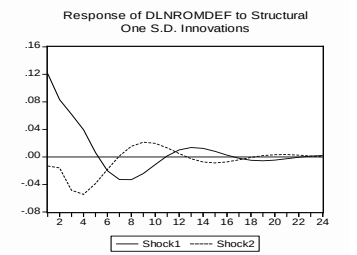
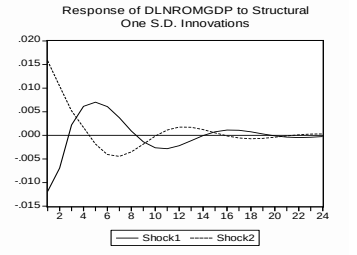


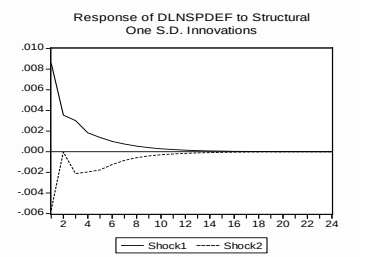


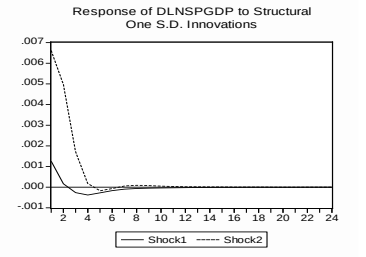
Romania



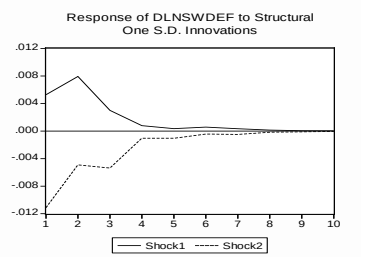


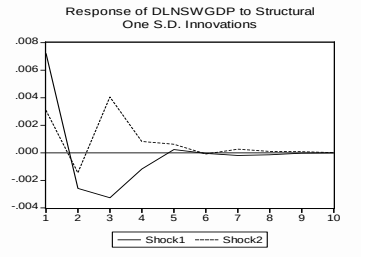
Spain





Sweden





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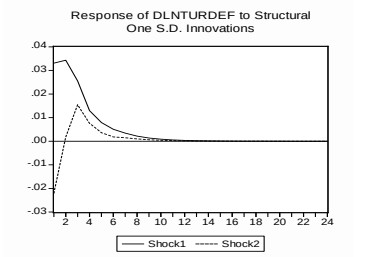

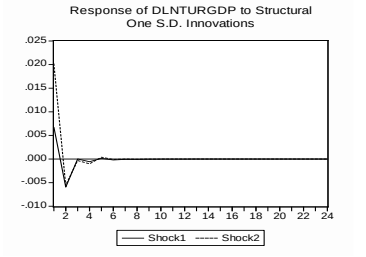

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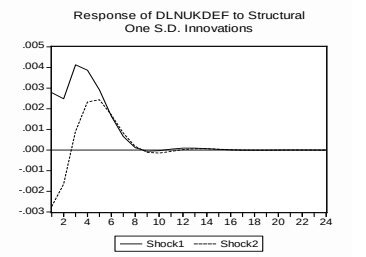
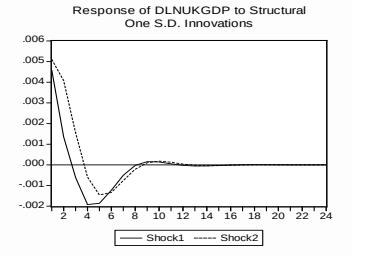
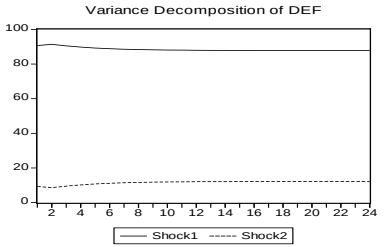
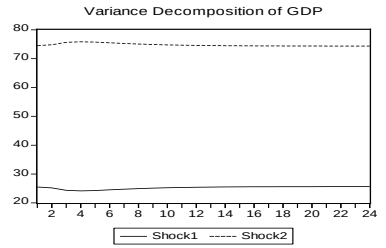




Appendix: 2
Variance Decomposition of Deflator and GDP of Different Geographic Regions

All Countries as A Balanced Panel





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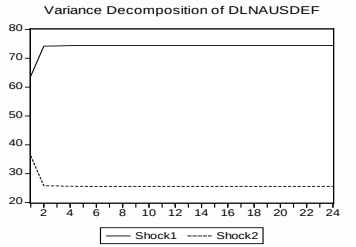

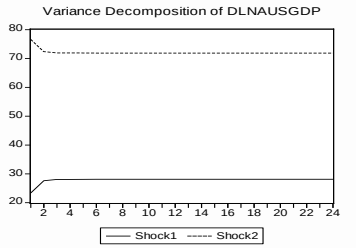

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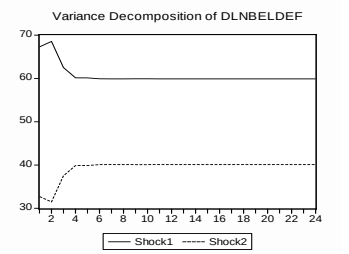

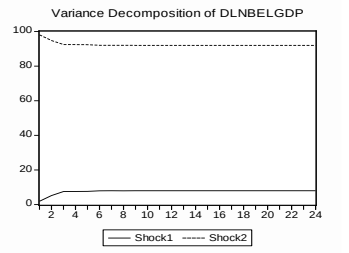

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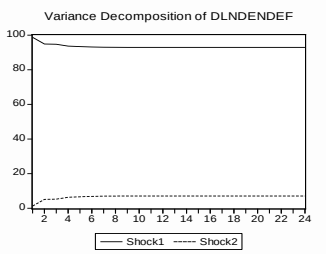

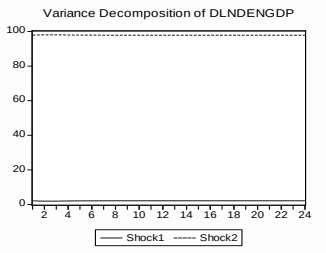

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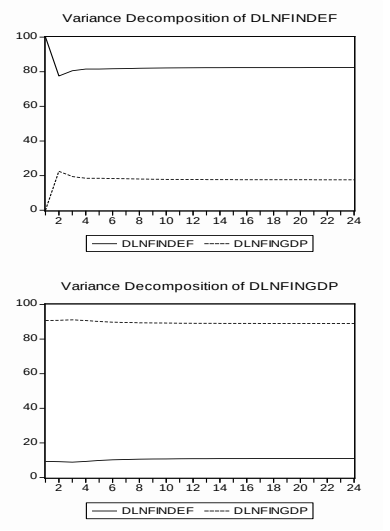

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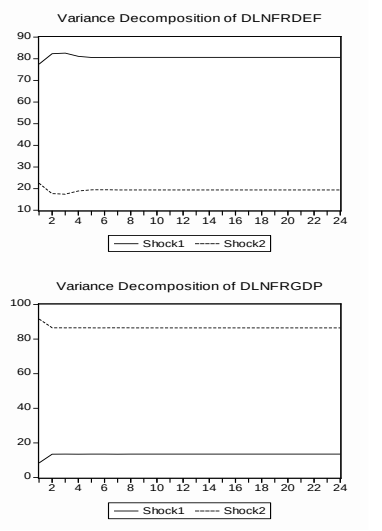

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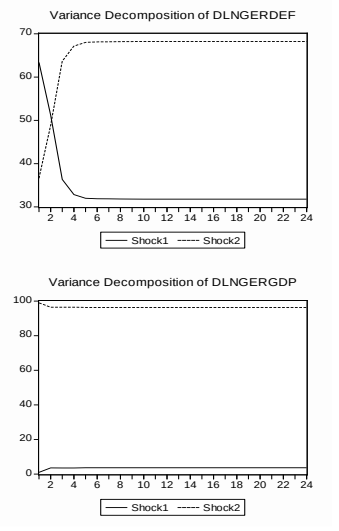

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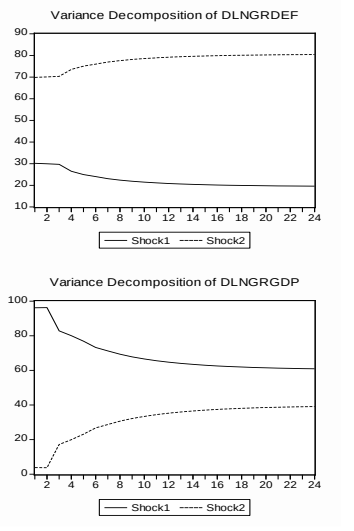

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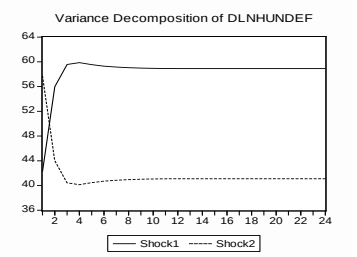

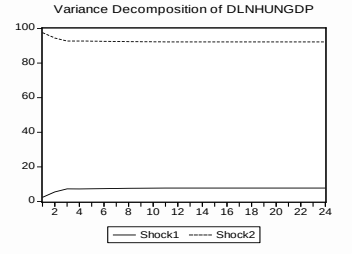

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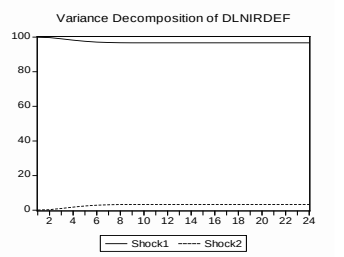

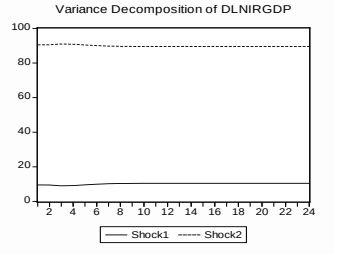

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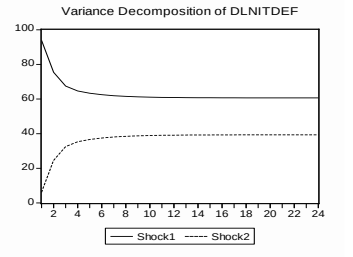

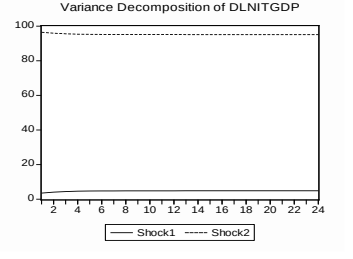

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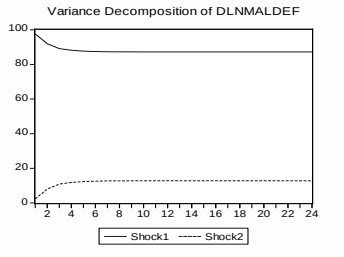

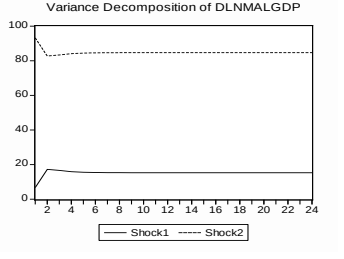

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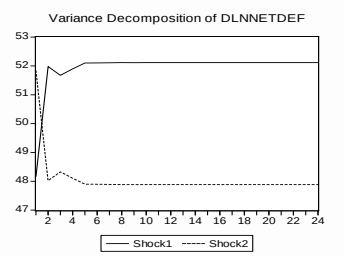

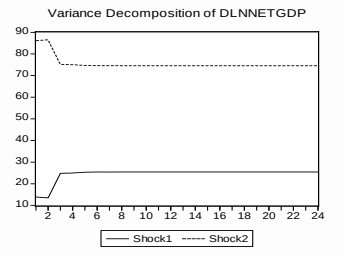

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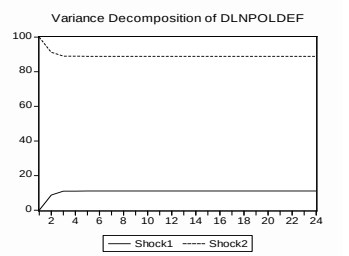

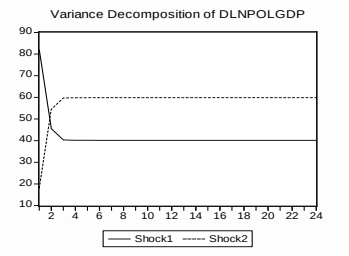

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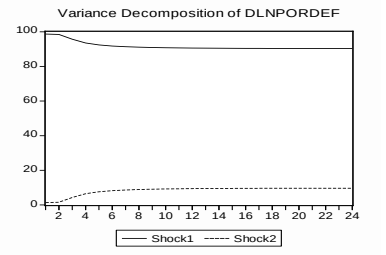

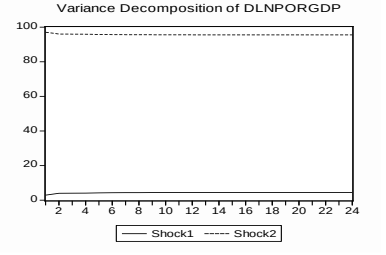

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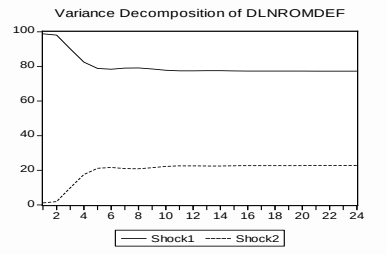

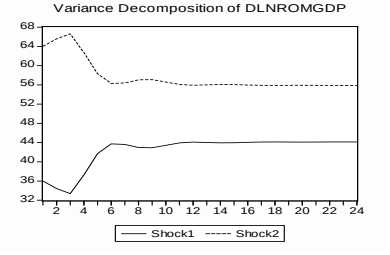

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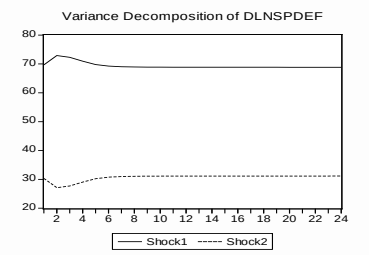
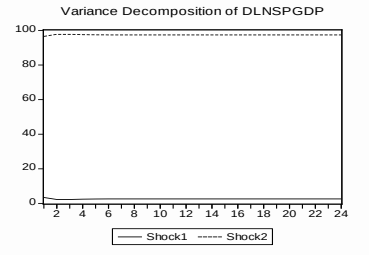
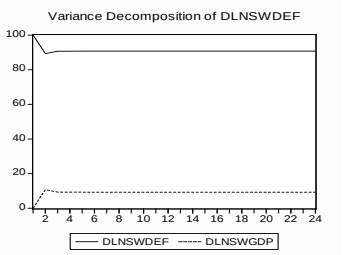
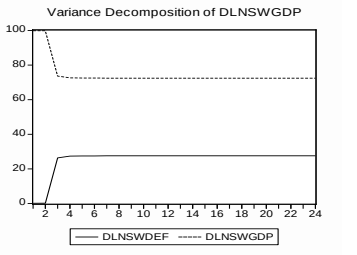




Sweden





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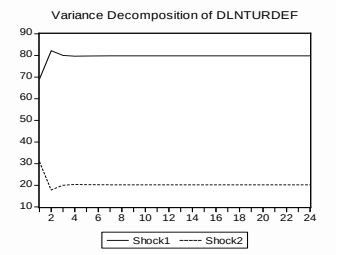

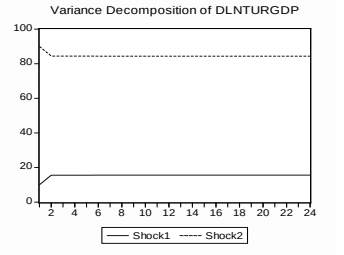

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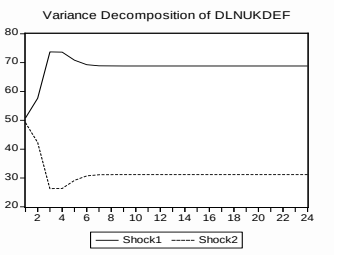

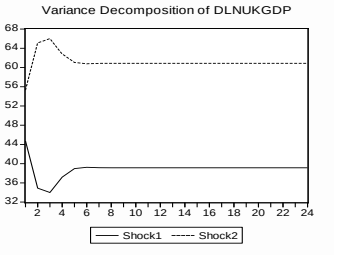

Alakbarov, N. & U. Utkulu (2020), “Asymmetries and Macroeconomic Shocks: The Pre-Crisis Period and Evidence for Europe”, *Sosyoekonomi*, Vol. 28(44), 283-317.